PB-214 029

AN ACCOUNTING SYSTEM FOR TRANSFER STATION OPERATIONS

Eric R. Zausner

Environmental Protection Agency
Cincinnati, Ohio

1971

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 214 029

AN ACCOUNTING SYSTEM for transfer station operations

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield, VA 22151

AN ACCOUNTING SYSTEM for transfer station operations

This report (SW-38ts) was written by

Eric R. Zausner

U.S. ENVIRONMENTAL PROTECTION AGENCY
Solid Waste Management Office
1971

I

An Environmental Protection Publication

This publication is also in the Public Health Service numbered series as Public Health Service Publication No. 2034. Its entry in two government publication series is the result of a publishing interface reflecting the transfer of the Federal solid waste management program from the U.S. Public Health Service to the U.S. Environmental Protection Agency.

Library of Congress Catalog Card No. 74-611943

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price 30 cents
Stock Number 5502-0026

AN ACCOUNTING SYSTEM for transfer station operations

Eric R. Zausner*

The increasing costs and complexities of solid waste handling require new, more sophisticated management techniques. Data on performance and the costs of operation and ownership are essential for the use of these management tools. A good information system is, therefore, a prerequisite to effective management. Although cost accounting represents only one part of the total information system, its design, installation, and utilization can represent the most significant step in the development of an effective solid waste management program.

Present information on transfer stations activities and associated costs is both inadequate and nonstandardized. Furthermore, the use of transfer stations will continue to expand as urbanization causes increased concentrations of solid wastes and a scarcity of proximate disposal sites. The proposed system provides a guide to the type and quantity of information to be gathered, its classification, and the method of collection. It is intended to be of use to municipal or private personnel involved in transfer station operation and ownership.

* Formerly Chief, Management Sciences Section, Operational Analysis Branch, Division of Technical Operations.

Installation of a cost accounting system can help the transfer station manager control the costs and performance of operation and also plan for the future. The system can be implemented as presented or modified to meet the specific needs and problems of the potential user.

The relationship of the transfer station to the total solid waste management system is shown in Diagram I. The accounting procedure can be utilized with all types of transfer operations: compaction and noncompaction, truck transfer, and hauling by railroad cars or barges. In the last two cases, some provision may be needed to account for disposal charges.

System Benefits

Some of the more important advantages are:

1. The system facilitates the orderly and efficient collection and transmission of all relevant data. In fact, most of the data to be recorded are probably being collected already, although perhaps only sporadically and inefficiently. Hence, the added cost of installing the proposed system is minimal.

2. Reports are clear and concise and present only the amount of data required for effective control and analysis. They can be understood and completed easily by station personnel.

3. The data are grouped in standard accounting classifications. This simplifies interpretation of results and comparison with data from previous years or other operations. This, in turn, allows analysis of relative performance and operational changes.

4. The system accounts for **all** relevant costs of operations.

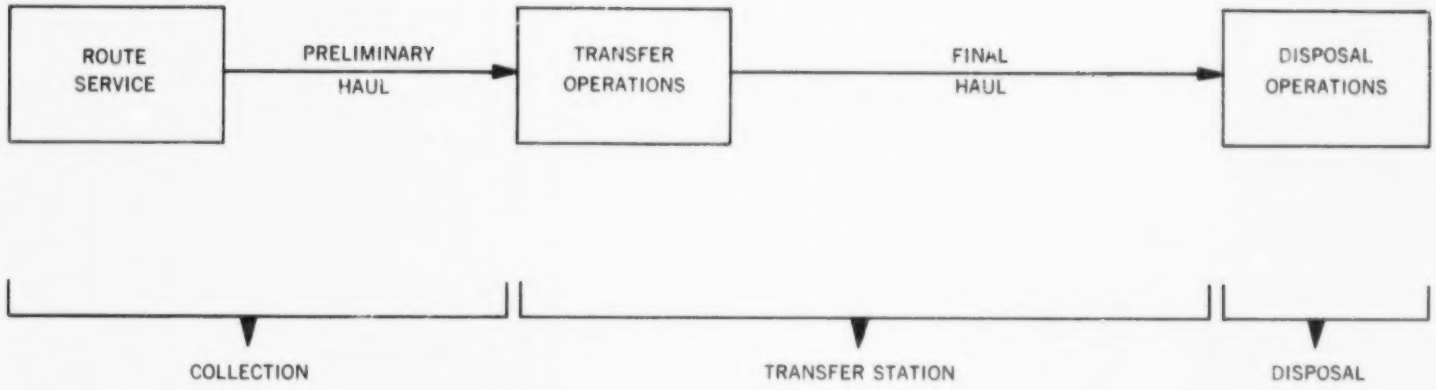
5. Because the system detects high costs and identifies their underlying causes, the supervisor can control expenses more effectively. Similarly, performance and efficiency may be monitored and controlled.

6. Accountability is superimposed on the system to indicate who or what is responsible for the increased costs.

7. The data provided are in a form that aids in the short- and long-range forecasting of operating and capital budgets. Requirements for equipment, manpower, cash, etc., can be

DIAGRAM I

SOLID WASTE MANAGEMENT SYSTEM



estimated to aid budgeting and planning at all levels of management. The data are also available for later evaluation and analysis using operations research techniques.

8. The system, with only minor modifications, is flexible enough to meet the varying requirements of different sizes of transfer stations.

Cost Centers and Cost Allocation

The complexity of transfer station operations requires a breakdown and description of operations to facilitate analysis. In this presentation, the transfer station is assumed to consist of several interrelated suboperations, each of which is analyzed separately. These suboperations are called cost centers because expenses are accumulated separately for each of these functional activities (Diagram II). Analysis and control are simplified if excessive costs or inefficiencies can be traced to a functional activity or area of the facility.

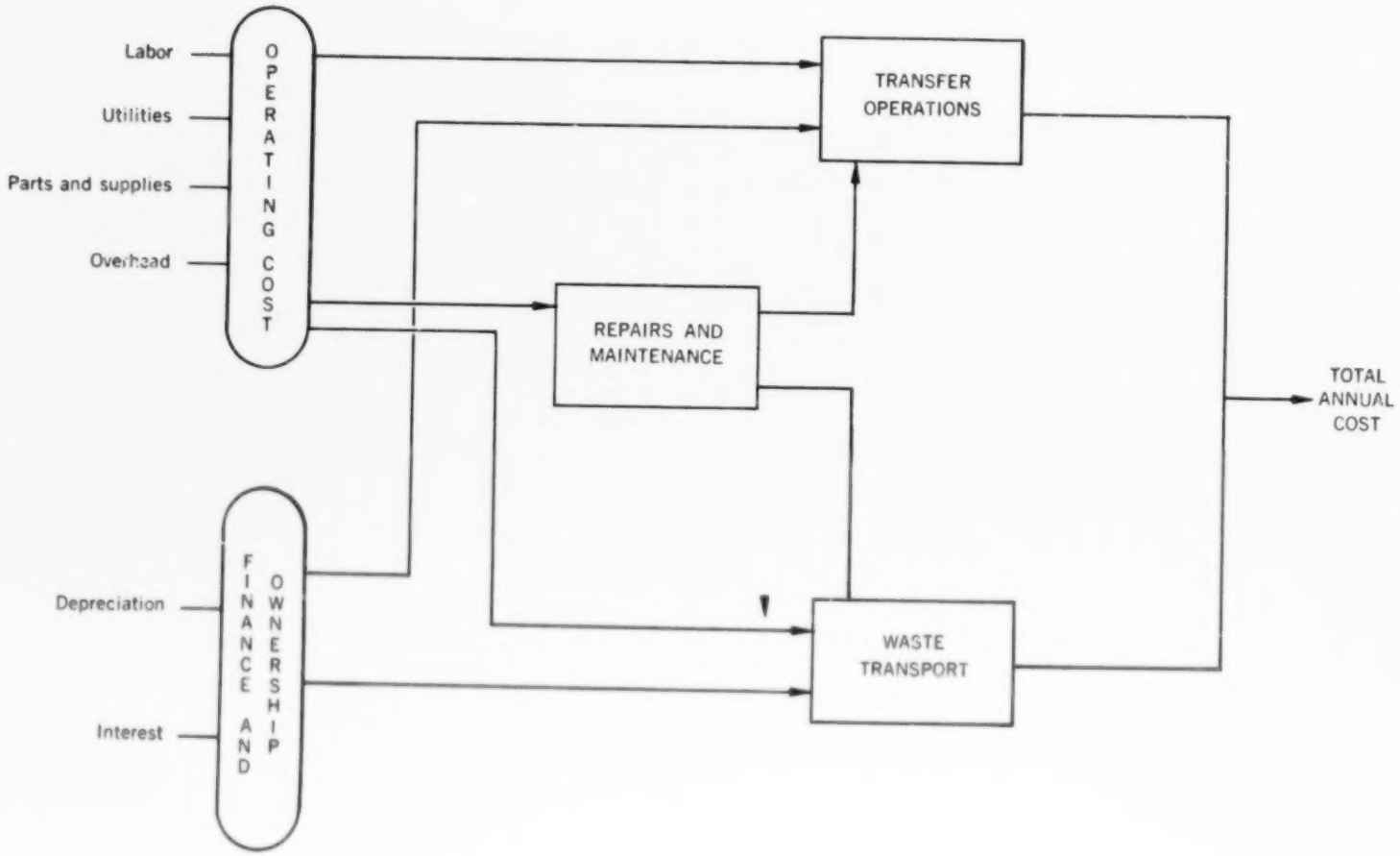
The number of cost centers required increases as the size and complexity of operations increase. Additional cost centers, however, require the collection of more data, and this increases costs. In most cases, transfer operations would include activities at the transfer station as well as the final haul to the disposal site. In this event, three cost centers would probably be able to gather adequate information without incurring excessive data collection costs. The Transfer Operations cost center and the Waste Transport cost center are called direct cost centers because they are directly associated with transfer and haul operations. Repairs and Maintenance is an indirect cost center. All repairs and maintenance expenses are accumulated in it and then allocated to the other centers based on the amount they have incurred. Because repairs and maintenance costs can be a large percentage of total expenses, the use of a separate center focuses attention on this critical area.

If railroad cars or barges are used, the cost of the final haul may not be included in a separate center but be accounted for as a total charge for both final haul and disposal.

The centers classify costs by one of two functions—operations and financing and ownership. Operating costs include

DIAGRAM II

COST CENTERS AND COST ALLOCATION



labor, parts and supplies, utilities, external charges, and overhead. Financing and ownership costs consist of depreciation and interest. Table I summarizes these costs and presents brief definitions of each.

There are many alternatives for actually allocating operating costs. A straightforward method for each type of expense will be outlined. Labor charges should be allocated to the cost centers based on the number of hours employees worked in each and on their respective wage rates. Parts and supplies include oil and gasoline as well as any materials used for repairs and maintenance. Oil and gasoline costs are assigned directly to the Waste Transport cost center because they are incurred by its vehicles. All other parts and supplies are allocated to each direct cost center after being recorded in the Repairs and Maintenance cost center. Repair charges levied by other municipal departments or private firms are also allocated to the direct cost centers after being recorded in the indirect cost center. Utility costs are incurred by the Repairs and Maintenance and the Transfer Operations cost centers. These expenses can be divided between them on the basis of an engineering estimate or, for simplicity, they can be assigned completely to the Transfer Operations cost center. General overhead, which includes supervision, administration and charges from other departments (payroll, accounting) can be allocated equally to each cost center or on the basis of the number of employees each has.

Finally, costs accumulated in the Repairs and Maintenance cost center are allocated to the two direct cost centers based on the expenses each has incurred. Their sum is the total operating cost.

Capital costs are easily associated with each of the direct cost centers. For instance, the capital cost of transfer vehicles can be associated with the Waste Transport center, while the purchase of scales can be included in the Transfer Operations cost center. Depreciation for each center can be calculated with these capital costs and estimates of their expected useful lives. Total interest cost can be allocated based on the proportions of capital utilized in each center.

These allocation procedures are illustrated in Diagram II.

TABLE I
SUMMARY OF COST TYPES

Labor (1)	_____	
Parts and supplies (2)	_____	
Utilities (3)	_____	
Overhead (4)	_____	
TOTAL OPERATING COSTS		_____
Depreciation (5)	_____	
Interest (6)	_____	
TOTAL FINANCING AND OWNERSHIP COSTS		_____
TOTAL COSTS		_____

(1) Labor includes all direct wages, overtime pay and fringe benefits. Fringe benefits include the costs of group insurance, social security, pensions, vacation benefits, etc.

(2) Parts and supplies include oil, gas, grease, repair parts, miscellaneous supplies, etc.

(3) Utilities include electric, natural gas, water, etc.

(4) Overhead includes supervision, payroll and accounting services by other departments, liability and property insurance, taxes, and external charges. External charges include audits, contractual services, etc., when they are performed by other municipal departments, private contractors or consultants.

(5) Depreciation may be calculated using either straight line or accelerated methods.

(6) Interest should represent actual costs of funds.

The actual system is designed to facilitate the accumulation and allocation of costs to the centers.

Forms and Reports

Information flows through the cost system by way of eight reports (Diagram III). They transmit data collected in the field for use at various levels of supervision and management.

The reports are most easily grouped into those that are primarily used to collect data on operations and those that are used to reduce and analyze for decision making and control.

Reduction and presentation cannot be accomplished unless all pertinent activities and cost information are recorded daily. If this is not done, the data cannot be retrieved later. Transfer station personnel, supervisors, and others involved in operations primarily use Forms 1 through 4 to record the data required.

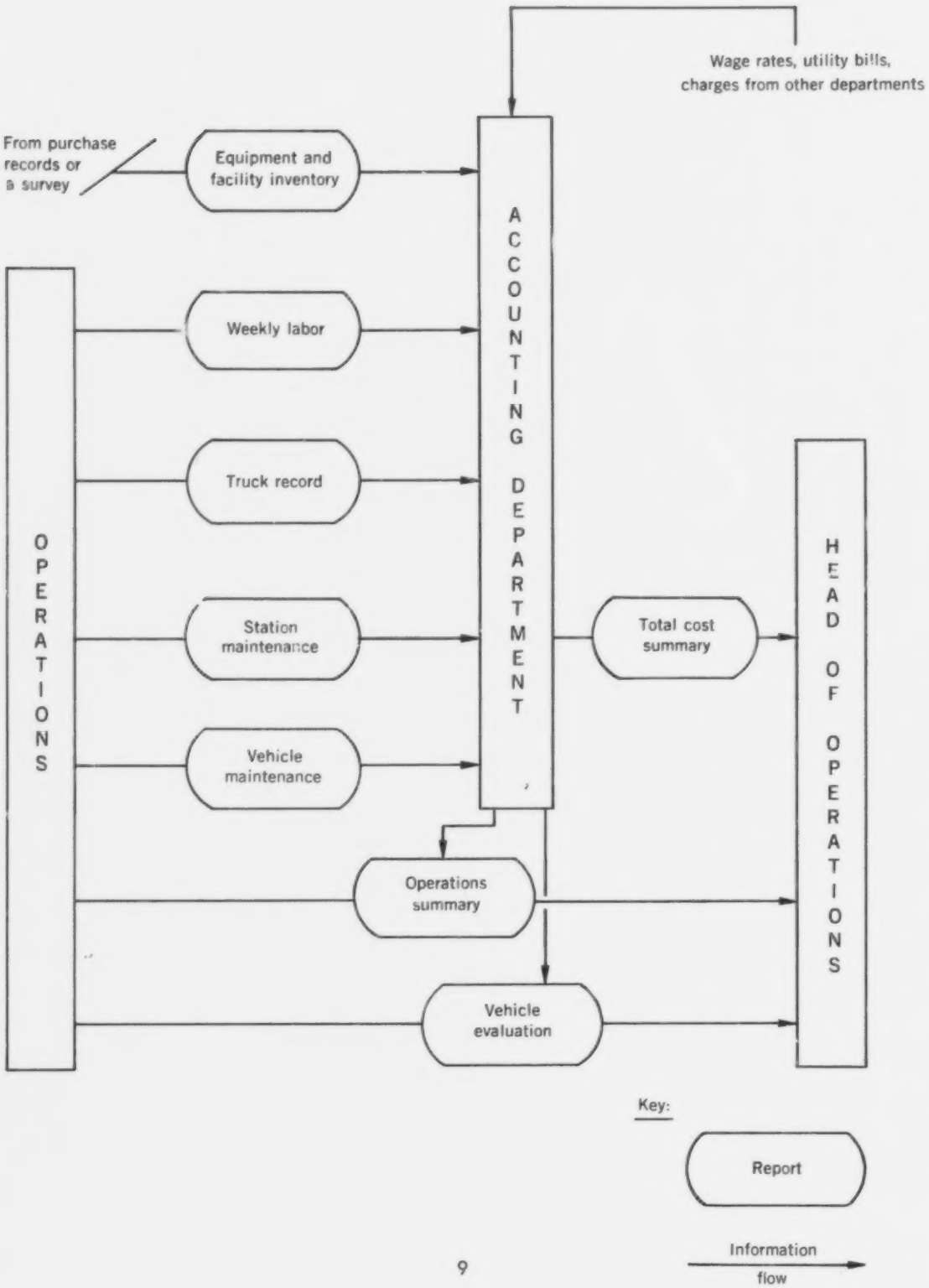
Weekly labor report (Form 1). Daily entries of labor activity are recorded in duplicate at the site by the foreman or supervisor. One copy is forwarded to the payroll department for determining weekly wages. The supervisor or the accounting department uses the other copy to compute the total hours worked and to assign the time and associated costs to the cost centers.

Daily truck record (Form 2). This form shows the quantities, sources, and types of solid waste delivered to the transfer station. The number, identification, and net weight of outgoing transfer vehicles are also recorded. Each delivery or departure is entered by the weighmaster. The form is forwarded to the accounting department at the end of each month. In addition to using recorded weight data to bill public and private users later, the sources and types of waste data are useful in special analyses of trends, compositions, and distributions of solid wastes in the community.

Transfer station maintenance record (Form 3). This form accumulates the activities and associated costs of repairing and maintaining the transfer station. Entries are made only when repairs are undertaken. These data are particularly useful in anlyzing maintenance department performance,

DIAGRAM III

REPORTS AND INFORMATION FLOW



FORM 1

WEEKLY LABOR REPORT

DATE: _____

TRANSFER STATION IDENTIFICATION _____

Employee ident.	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7		Individual totals	Note causes and hrs. of absence, etc.
	Cost center*	Hrs.	Cost center	Hrs.	Cost center	Hrs.	Cost center	Hrs.	Cost center	Hrs.	Cost center	Hrs.	Cost center	Hrs.		
TOTALS	X		X		X		X		X		X		X			XXXXXXXXXXX

Instructions: Transfer station supervisor to complete this form daily. List all employees separately, including temporary help. "Hrs." refers to hours worked daily. At the end of the week forward one copy to the payroll department and retain the original for further use.

*For this column TO, WT, or R&M could be used to indicate the cost center in which each employee is working. For more accuracy, the following classifications are suggested:

D (driver), VM (vehicle maintenance), SM (station maintenance), W (weigh-master), F (foreman), S (supervisor), O (compacting equipment operator), C (clerk).

FORM 2

DAILY TRUCK RECORD

TRANSFER STATION _____ DATE: ___/___/___

SIGNATURE _____

No.	Truck ident.*	Time	Incoming wastes		Weighted load	Weight empty or tare wt.	Net amount of wastes	
			Source	Type			Incoming	Outgoing
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
TOTALS		X	X	X	X	X		

Instructions: To be completed by weighmaster for each delivery of wastes or departure of transfer vehicle.

Symbols:

Source: R (residential), C (commercial), I (industrial)

Type: T (tires), G (garbage), etc.

*Truck ident. is # of public truck; if private vehicle list name of company for billing purposes. Also identify transfer vehicles by number, driver's name, and type (barge, railroad car, etc.).

FORM 3

STATION MAINTENANCE RECORD

STATION IDENTIFICATION _____ For Period _____

Date	Equipment or part of facility repaired	Type repair	Hrs. station was down	Labor hrs.	Parts description	Labor cost	Parts cost	External charges	Overhead cost	Total

equipment availability, and equipment repair costs in the Transfer Operations cost center.

Vehicle maintenance record (Form 4). This form accumulates the activities and associated costs incurred in maintaining the transfer vehicles. A separate sheet is kept for each vehicle, and entries are made only when maintenance or repairs are undertaken. These data are useful in analyzing individual truck efficiencies and repair costs in the Waste Transport cost center. The data on this form and those on Form 3 represent the overall activity and costs in the Repairs and Maintenance cost center.

Equipment and facility inventory (Form 5). This form is completed when construction is finished or when the cost system is first implemented. It is updated only when improvements or new equipment are constructed, purchased, or sold. In addition to collecting the data required to calculate depreciation for the period and allocating it to cost centers, the form also summarizes the bond and interest information needed to arrive at total costs of financing and ownership.

Forms 6 through 8 are completed less frequently; these intervals depend on the type of information transmitted. To be effective, certain types of control and analysis require more frequent feedback than others. Forms 6 through 8 reduce the data contained in the first five as well as other information available to the accounting department.

Operations summary (Form 6.) This report summarizes system operations and its associated operating costs. The report can be for the whole system or for individual stations, since it is a critical cost control mechanism. The report should be prepared monthly. The accounting department compiles it and forwards copies to the supervisor and the head of the sanitation department. The total unit costs presented, as well as unit costs for the various centers, indicate where excessive expenses were incurred. In addition, various measures of efficiency are shown to isolate the cause or causes of high operating costs. For instance, "tons number of trips to the disposal site" adequately measures truck utilization in the Waste Transport cost center. This measure can help improve scheduling and reduce costs.

FORM 4

VEHICLE MAINTENANCE RECORD

TRUCK IDENTIFICATION _____ For Period _____

DATE	Odometer reading	Type of service or repair	Hrs. down	Labor hrs.	Description parts and supplies	Labor cost	Parts cost	External charges	Overhead (rate hrs.)	Total cost
TOTALS	X	X			X					

FORM 5

FACILITY AND EQUIPMENT INVENTORY

Date ____/____/____

Equipment description	Capacity (cu. yd.)	Model No.	Model year	Manufacturer's name	Date of purchase	Purchase price	Estimated life	Annual depreciation	Monthly depreciation
TOTAL	X	X	X	X	X		X		

Facility description	Description (quantity, size, etc.)	Date put in use	New cost	Estimated total life	Other comments	Annual depreciation	Monthly depreciation
Land						X	X
Buildings							
Equipment							
Site improvement							
Other							
TOTALS	X	X		X	X		

Financing Data

Bond type	Face value	Premium or discount	Interest rate	Yearly interest*	Monthly interest

*Interest must account for effect of premium or discount on bond sale.

FORM 6

OPERATIONS SUMMARY

For period _____ to _____

	Factor	Amount for this period	Percent variance from	
			Budget	Budget last period
TOTALS	Tons received			
	Average tons/day operated			
	Total operating cost			
	Total operating cost/ton			
	Labor cost/ton			
	Parts and supplies cost/ton			
	Utilities cost/ton			
	External charges cost/ton			
	Overhead cost/ton			
TRANSFER OPERATIONS COST CENTER	"Cost center" cost/ton			
	Tons/hr. of operation			
	Percent volume reduction			
WASTE TRANSPORT COST CENTER	"Cost center" cost/ton			
	Tons/number of trips to disposal site			
	Labor hrs./ton			
REPAIRS AND MAINTENANCE COST CENTER	"Cost center" cost/ton			
	Repair and maintenance cost/hr. of operation			
	Waste transport percent			
	Transfer operations percent			
	Percent time vehicles down			
	Percent time station down			

Vehicle evaluation report (Form 7). This form is optional. It is not needed if barges or railroad cars are used because transport costs are incurred on a contract basis.

The data accumulated on this form represent the total and individual costs of operating the transfer vehicles. Statistics are accumulated separately for each piece of equipment, and this allows efficiency and cost to be evaluated. The data may also be used to determine when to sell or trade a vehicle. Since this decision involves long-term assets, only quarterly or semiannual reports are necessary. More frequent preparation would not substantially improve decision making that would minimize operating costs. It may be desirable, however, to prepare reports on a truck if it exceeds a given level of repair charges. For instance, each vehicle's repair expenses can be compared with the average for all the vehicles; when a vehicle exceeds this average by 25 percent or 50 percent, it can be singled out for further analysis. The accounting department, which prepares this form, sends a copy to the operational supervisor and the head of the sanitation department.

Total cost summary (Form 8). All the activities and costs associated with transfer system operations for a selected period are compiled on this report from data available in the Transfer System Operations Summaries and on the Facility and Equipment Inventory forms. The combined operating expenses and the depreciation and interest figures represent the total cost of operations for the period. The report also summarizes the sources and amounts of revenues associated with the system's operation. The accounting department can complete this form quarterly or semiannually and send it to the head of the sanitation department or his equivalent.

Report Flow Summary

A brief summary may help to put the system in perspective. The personnel directly engaged in transfer activities complete data accumulation forms daily and transmit them periodically to the accounting department. The latter collates the information and adds additional data it has on file to complete summary reports on performance, activity, and costs. These forms are then sent back to the supervisor for

FORM 7

VEHICLE EVALUATION

GARAGE _____ For period _____ to _____

Equipment identification	Total miles	Hrs. down	Hrs. down/total hrs.	Repairs and maintenance cost	Fuel cost	Repairs and maintenance cost/hr.	Fuel cost/hr.	Total cost/hr.	Total cost
TOTALS	X		X			X	X	X	
AVERAGES	X								
BUDGET				18					

TOTAL COST SUMMARY

FORM 8

DISTRICT _____ For period _____ to _____

DATA	FOR THIS PERIOD	BUDGET THIS PERIOD	CUMULATIVE (YEAR TO DATE)	BUDGET (YEAR TO DATE)
Tons of waste received				
Total operating cost				
Total financing and ownership cost				
TOTAL COST				
Operating cost per ton				
Financing and ownership cost per ton				
TOTAL COST PER TON				
Public revenues (participating communities)				
Private revenues (industry, etc.)				
Miscellaneous revenues				
TOTAL REVENUES				
TOTAL REVENUES PER TON				
NET COST (PROFIT)				
NET COST (PROFIT) PER TON				

control purposes. In addition, selected summary reports on total cost and equipment performance are compiled and forwarded to the supervisor and to his immediate superior.

System Utilization

Only with efficient and intensive utilization of the information generated by the accounting system and its forms can the additional time, effort, and money required to implement and maintain it be justified. The system's intensive use promotes two major objectives—quality control and cost control. Reduce costs must be accomplished without degrading operating quality. Similarly, quality is interrelated with the costs of obtaining it.

All the factors that affect the quality and effectiveness of transfer system operations can be translated into costs. Cost control does not call for economizing at the expense of quality. On the contrary, once an acceptable level of operations and costs has been achieved, the system can help the supervisor maintain it.

Effective control requires timely recognition and assignment of responsibility for any increased costs. Comparing unit costs (cost per ton of waste transferred) with the current budget and that for the corresponding period of the preceding year helps pinpoint excessive expenses. This approach facilitates the analysis of costs, independent of changes in the level of activity. Cost center breakdowns help single out the factor or person responsible for increased expenditures, and this allows corrective action to be initiated.